United States Patent [19]

Speshyock

[11] **4,231,364**

[45] **Nov. 4, 1980**

[54] **RESPIRATORY CONTROL**

[76] Inventor: **Fred R. Speshyock,** 33091-R Calle Perfecto, San Juan Capistrano, Calif. 92675

[21] Appl. No.: **34,649**

[22] Filed: **Apr. 30, 1979**

[51] **Int. Cl.**[3] **A62B 7/10**

[52] **U.S. Cl.** **128/206.15;** 128/207.14; 128/136

[58] **Field of Search** 128/206.15, 206.12, 128/205.29, 206.27, 204.13, 207.16, 207.14, 206.21, 200.24, 202.13, 205.24, 205.25, 206.27; 272/99

[56] **References Cited**

U.S. PATENT DOCUMENTS

2,039,142	4/1936	Brehm	128/207.16 X
3,731,678	5/1973	Pyzel	128/205.27 X
3,908,665	9/1975	Moses	128/207.14
4,054,134	10/1977	Kritzer	272/99 R X
4,141,703	2/1979	Mulchi	128/206.15 X

Primary Examiner—Henry J. Recla

Attorney, Agent, or Firm—Joseph R. Dwyer

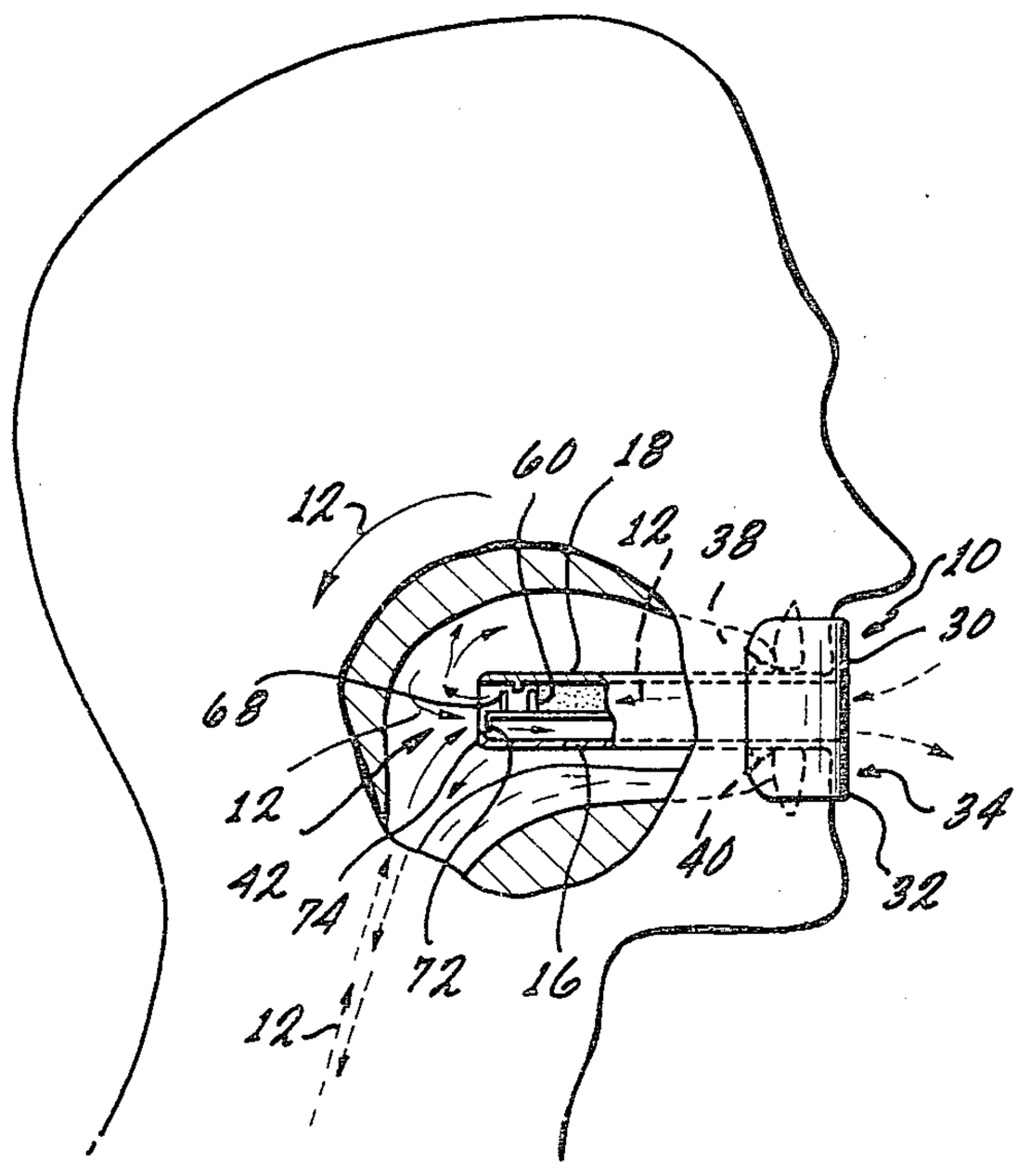
[57] **ABSTRACT**

A respiratory control comprising a mouthpiece of a shape and size for insertion in a person's mouth having a centrally located filtering cartridge and valve means to control the flow of air past the filtering material on inhale and out a separate exhale corridor on exhale so that the exhaled bacterial, virus or otherwise contaminated air is never mixed with the filtered and enhanced air and the filter is kept clean of contaminated air at all times. Thus, the inhalation of infectious substances of whatever type exhaled, or in the immediate area, are not recycled back into the body.

The filtering cartridge is a removable throwaway insert which can be simply plain, (dry), or medicated and can be made available as a sealed package purchasable separately from the mouthpiece and disposed after use.

In one embodiment the valve means is part of the filtering cartridge and in a second embodiment the valve means is part of the mouthpiece.

18 Claims, 10 Drawing Figures



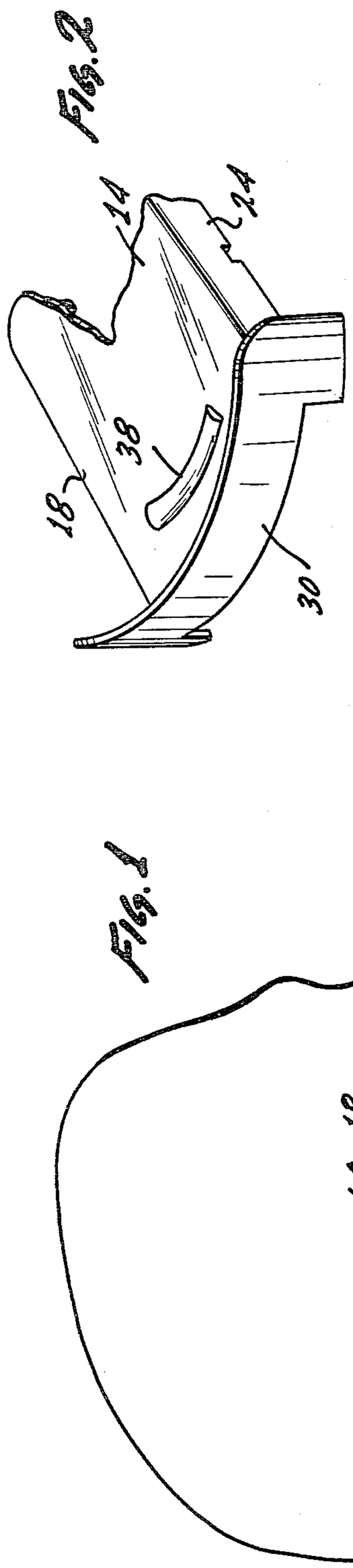
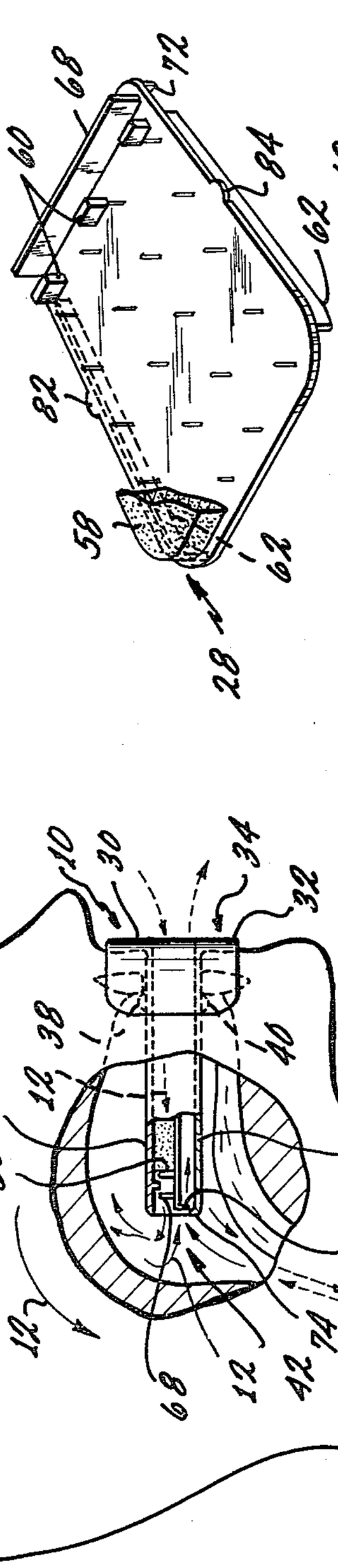


Fig. 2



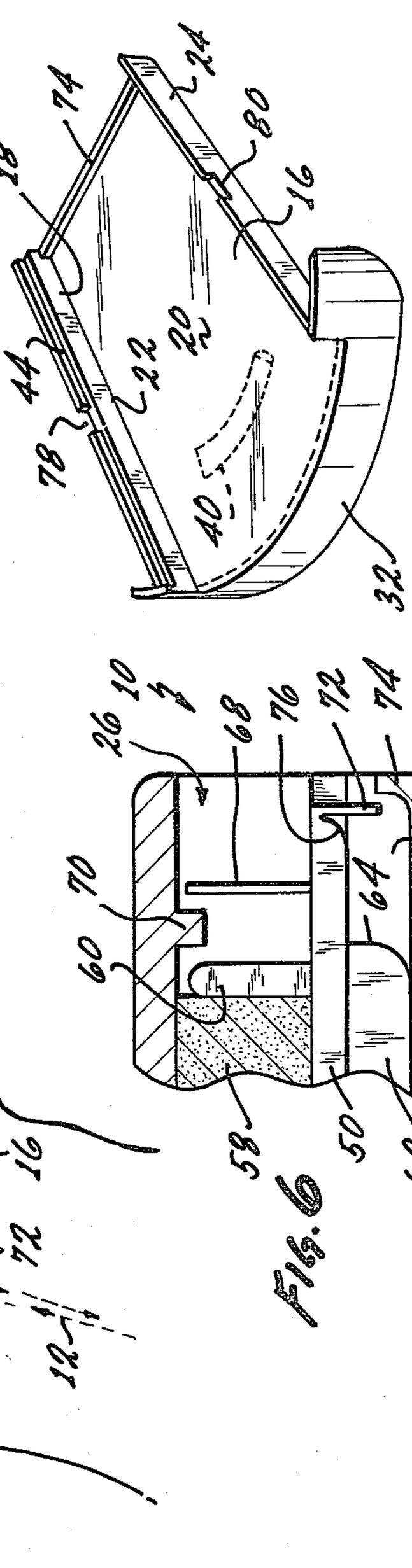
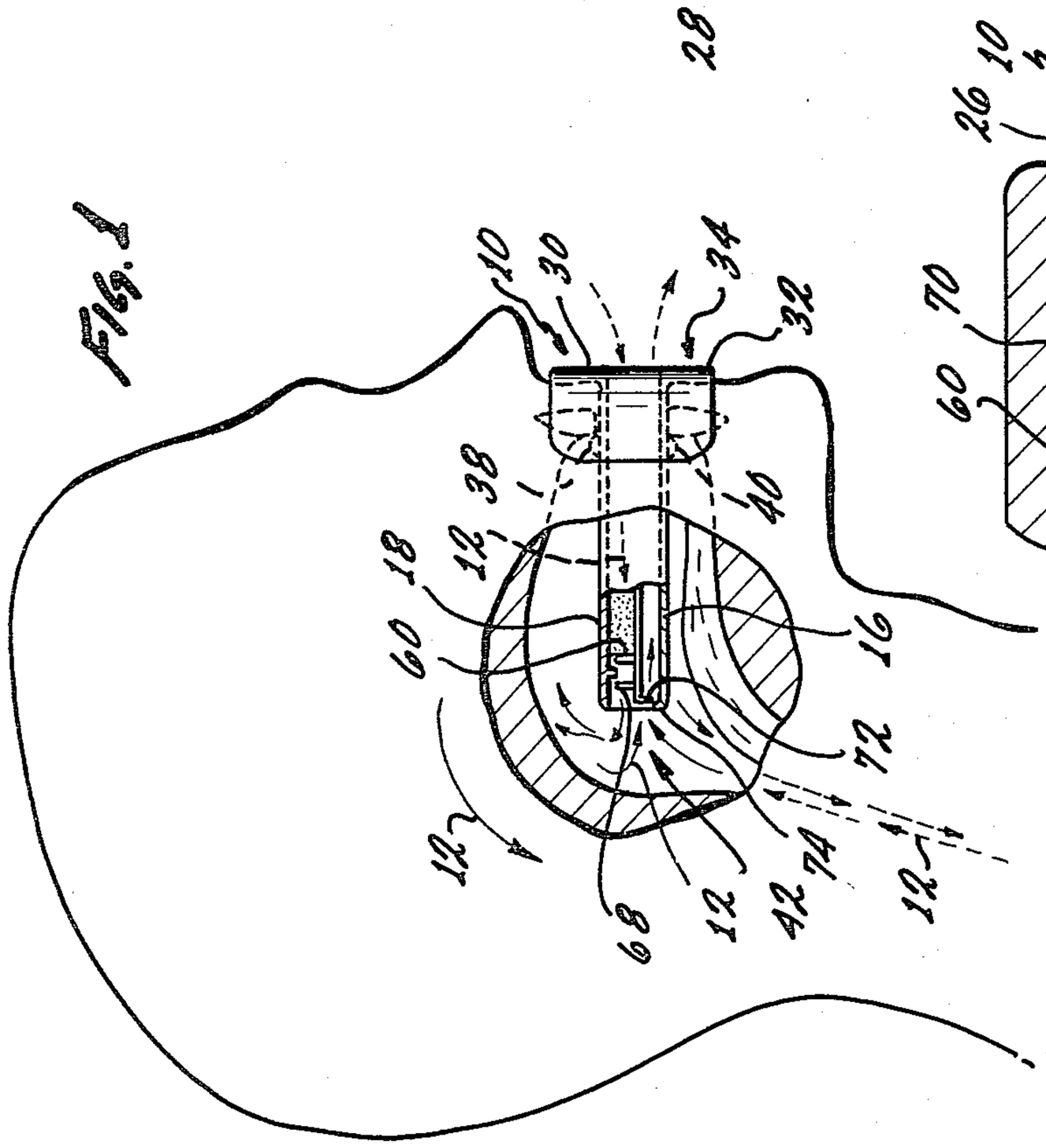


Fig. 1



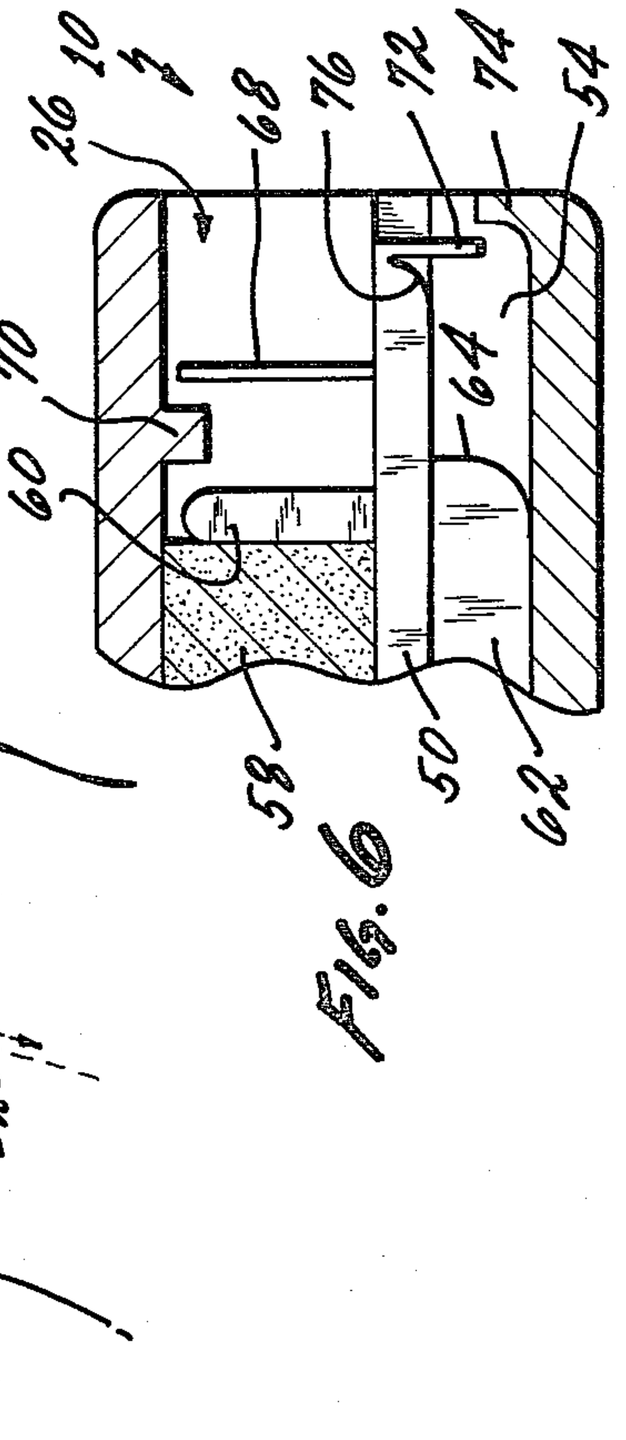


Fig. 6

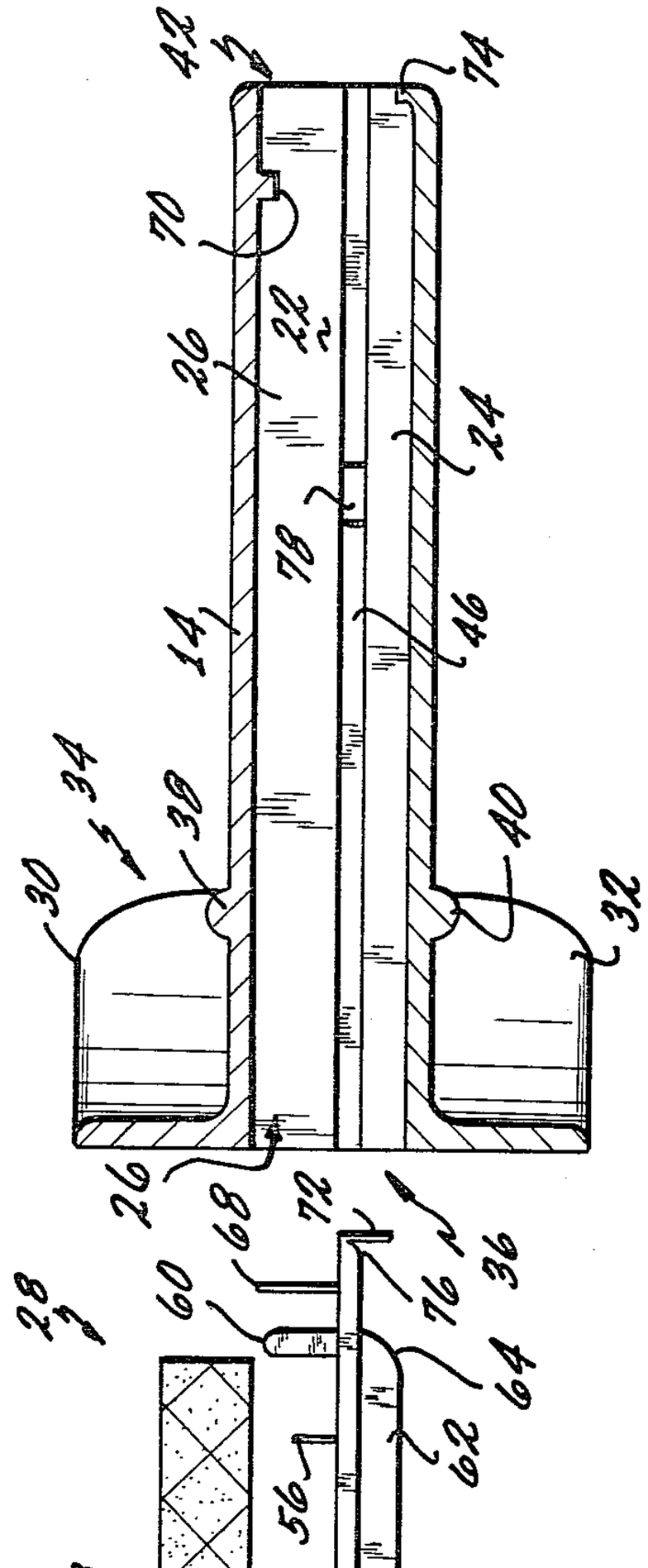


FIG. 3

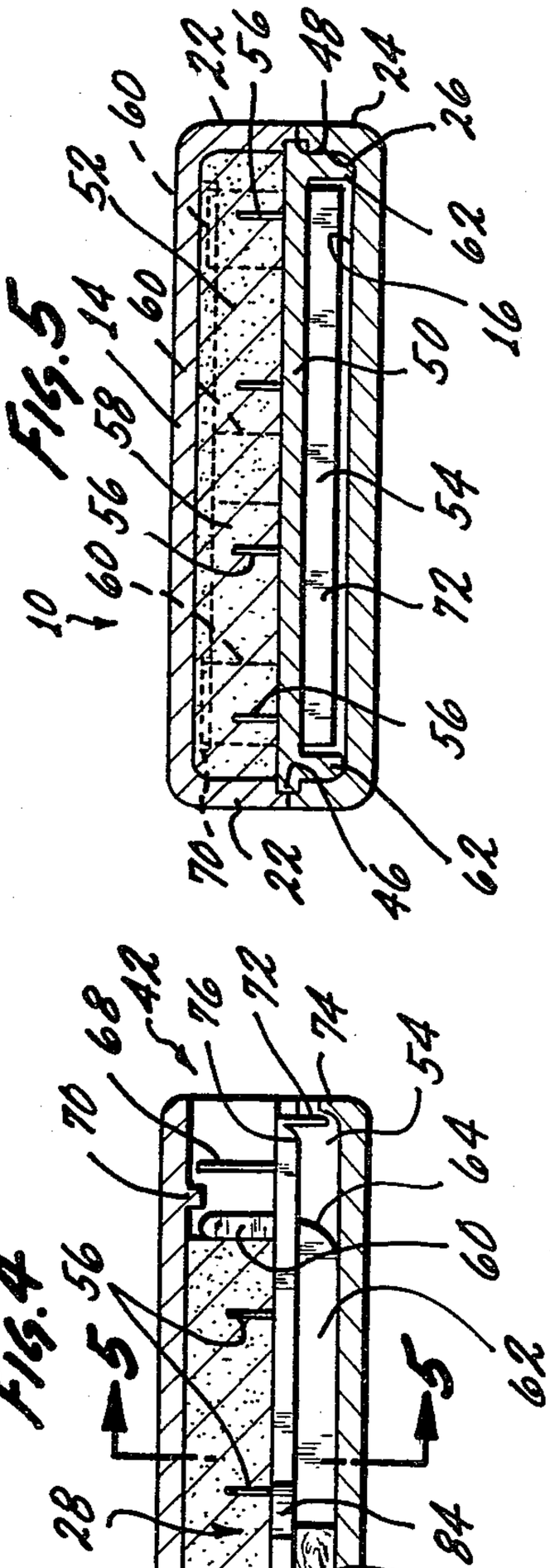


FIG. 4

FIG. 5

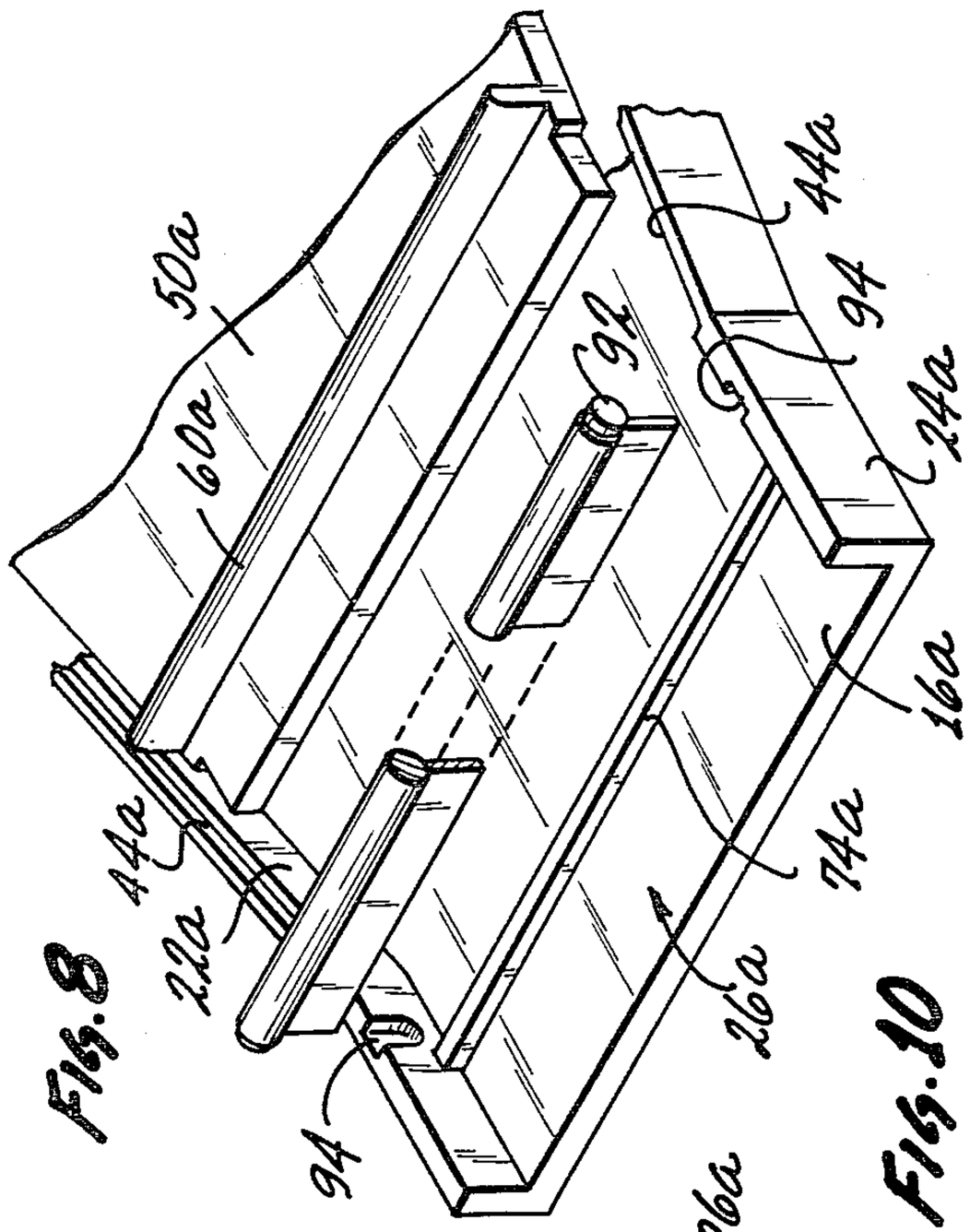


FIG. 8

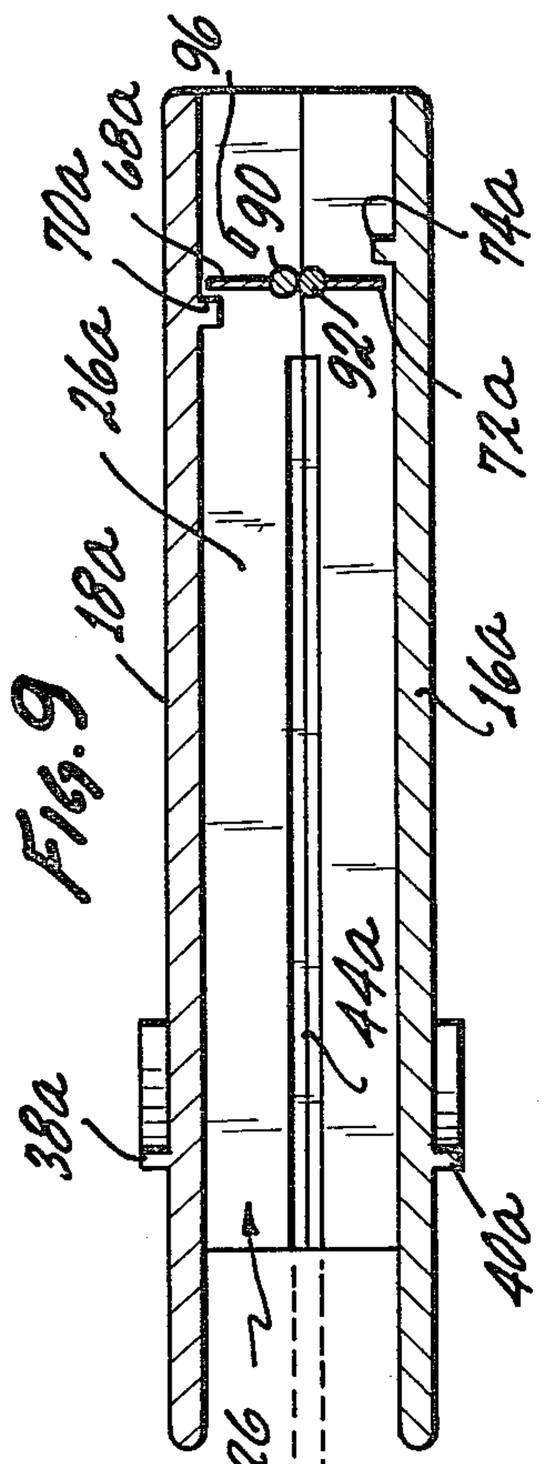


FIG. 9

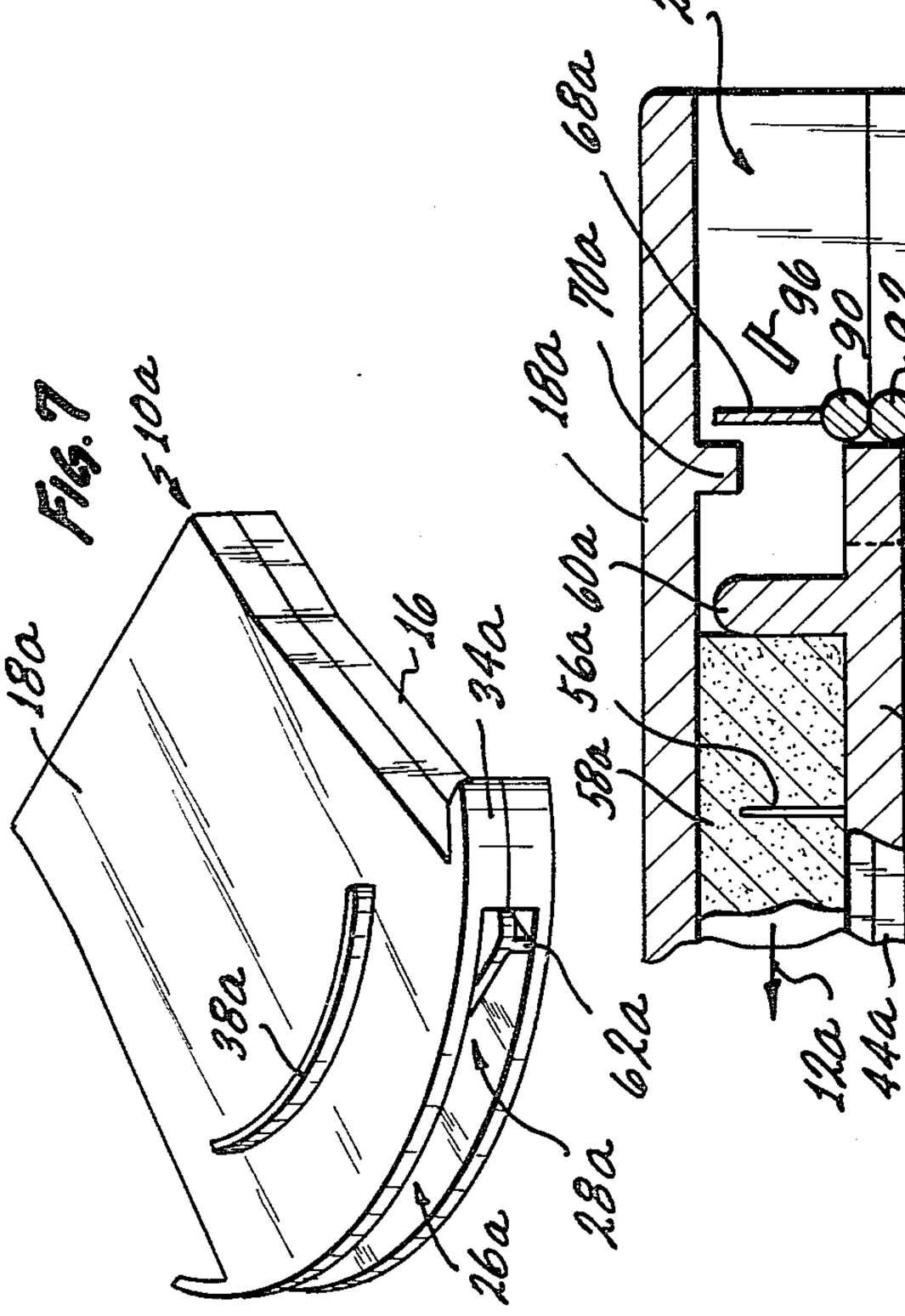


FIG. 7

FIG. 10

RESPIRATORY CONTROL

BACKGROUND OF THE INVENTION

This invention relates, in general, to the relief of breathing problems and, in particular, to a new and improved respirator control suitable for insertion in a person's mouth to provide filtered air and controlled breathing.

People who have difficulty in breathing, whether due to nasal congestion, the common cold, allergies, sinus congestion or smog, or the like, or who have difficulty sleeping because of throat dryness, usually depend upon currently available items, such as, throat lozenges, cough drops, nasal inhalers, and the like, all of which meet with limited success in relieving the congestion and other respiratory problems.

In the market today, there exists a need for a respiratory control which can be used, either at home, office, or in the hospital or on the street, for relief of respiratory problems by making filtered, plain, moisterized, or medicated, or otherwise inhaled air, available in a simple, inexpensive and expeditious manner.

Accordingly, it is an object of this invention to provide a respiratory control for the relief of respiratory problems which is inexpensive, readily available, and which can provide filtered, plain, moisterized, and/or medicated or otherwise enhanced, air easily and simply.

SUMMARY AND ADDITIONAL OBJECTS AND ADVANTAGES OF THE INVENTION

The respiratory control which meets the foregoing object comprises a mouthpiece of a size and shape for insertion in a person's mouth having a centrally located filtering cartridge and valve means which control the flow of air so that a person inhales filtered air in one air inhale corridor and exhales contaminated air through a separate exhale corridor. The valve means controls the inhale flow of air past the filtering material and out the separate exhale corridor so that inhaled filtered air is never mixed in the mouthpiece with the exhaled contaminated air and thus the filter is kept clean and clear of contaminated air at all times. Also, the inhalation of bacteria, mucus or any infectious substances secreted from infected lungs, sinuses or other organisms that remain in the atmosphere immediately about the head, are not recycled (again inhaled) back into the body.

In a first embodiment of the invention, the valve means forms part of the filtering cartridge and in a second embodiment the valve means forms part of the mouthpiece.

The filtering cartridge can be a removable throw-away insert containing filtering material which can be simply plain, (dry), moistened or medicated depending upon the person's needs and can be made available as a sealed package, purchasable separately from the mouthpiece, and disposed after use.

Accordingly, it is an additional object of this invention to provide a respiratory control with a valve control for filtering means which keeps the filtering means free of contaminated exhaled air.

A more specific object of this invention is to provide a respiratory control with a valve control with a locking action wherein one valve is activated into an open position while the other is being pushed into a locked position and visa versa on inhale and exhale.

It is still another object of this invention to provide a removable filter cartridge for a mouthpiece which is

available separately with a filter which is plain for filtered air, moistened for oxygen enriched filtered air, or containing medication for medically enhanced filtered air.

Still another object of this invention is to provide a respiratory control of a suitable plastic material which is inexpensive, yet sterilizable and which may be used in the home, in the hospital, in smoggy areas or wherever respiratory control is needed.

This invention will be better understood as well as further objects and advantages thereof will become more apparent from the ensuing detailed description of two embodiments taken in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** illustrates the use of the respirator control constructed in accordance with the teachings of this invention,

FIG. **2** is an exploded view partially broken away to illustrate the various parts of the respirator control,

FIG. **3** shows the mouthpiece with the cartridge removed and the filtering material apart from the cartridge to show the construction thereof,

FIG. **4** is a cross-sectional view of the mouthpiece with the cartridge in place,

FIG. **5** is a cross-sectional view taken along line **5—5** of FIG. **4** and looking in the direction of the arrows,

FIG. **6** is an enlarged view of a portion of FIG. **4** to show the valve means in more detail,

FIG. **7** is a perspective view of a second embodiment of the respirator control,

FIG. **8** is a partial perspective view enlarged over the view in FIG. **7** and shown partially assembled to illustrate the valve means of this embodiment,

FIG. **9** is a cross-sectional view of the cartridge and mouthpiece to illustrate their relationship, and

FIG. **10** is an enlarged view of a portion of the respirator control to further illustrate the cartridge and valve means.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning first to FIG. **1**, there is shown an outline view of a person's head with the first embodiment of a respirator control **10** shown inserted in the mouth cavity for controlled breathing. The arrows **12** indicate the flow of the air when inhaled and exhaled. These arrows also show, in a general way, the flow of air in the sinuses and throat and in and out the control **10**.

Turning now to FIGS. **2–6**, and first to FIG. **2**, it can be seen that the respirator control **10** comprises upper and lower envelope pieces **14** and **16** with relatively flat walls **18** and **20** and complimentary side walls **22** and **24**. These envelope pieces, when brought together, define a mouthpiece with an internal cavity **26** (FIGS. **3–6**) in which is inserted a removable filtering cartridge or throw-away insert **28**. Each envelope piece is also provided with complimentary curved walls **30** and **31** which define a safety shield **34** and lip or mouth opening **36** when the two envelopes are brought together to define the cavity **26**. This safety shield **34** is contoured to overlap the lips of a person's mouth by a large margin so that the mouthpiece cannot be swallowed yet avoids interference with the nose and is preferably without connection points which would enable straps or other holding means to be attached to the safety shield to be

used to hold the mouthpiece in the mouth. This latter is important so as to enable the mouthpiece to be coughed out in any event of choking, vomiting, or the like. Also, spaced a slight distance from the safety shield, are a pair of ridges **38** and **40** located on the outside surfaces of the walls **18** and **20** and which together form a teeth grip ledge for the user's teeth as shown in FIG. **1** to aid in holding the mouthpiece in the mouth cavity.

From the safety shield **34**, the envelope pieces taper to give the cavity **26** a taper so that the throat opening **42** is smaller than the lip opening **36**. The side walls **22** and **24** are also provided with mating offset edges (only one being shown at **44** in FIG. **2**) to provide elongated grooves **46** and **48** in FIG. **5** on each side facing cavity **26** into which the edges of a base **50** of the filtering cartridge **28** may be inserted to divide the inner cavity **26** into two air corridors **52** and **54**. The upper corridor **52** is the inhale corridor and the lower corridor **54** is the exhale corridor; the inhale corridor **52** may be larger to compensate for the loss of air pressure through the filter material.

Turning now specifically to the removable cartridge **28**, it can be seen from the review of the drawings that the base **50** is relatively flat and tapered so as to nest in the cavity **26** and slideably fit into the groove **46** and **48**. The base **50** is provided on one surface with a plurality of pinlike projections or spikes **56** which serve to hold the filtering material **58** thereon during packaging, transportation, and to hold the material within the cartridge during insertion into the mouthpiece. The filtering material can comprise gauze, cotton, or the like, conventionally used for a filtering material and which can be moistened, provided with medication, or simply dry for filtering air in the upper inhale corridor **52**. This same side of base **50** is also provided with stop means in the form of upwardly extending posts **60** which locate the filtering material **58** and prevent its forward movement towards the throat opening **42**.

On the bottom side of the base **50**, there is provided a plurality of ribs or runners **62** (two shown) running generally in the direction of the air flow in the mouthpiece with curved ends **64** located near the forward end of the bottom wall. The purpose of these runners is to guide the base **50** into the grooves **44** and **46** and the curved ends **64** aid in the insertion of the cartridge because the filtering material may be slightly thicker than the space between the grooves **44** and **46** and the inside of the envelope wall **18**. The curved surface **64** permits a slight tilting of the cartridge as it is being inserted through the opening **36**.

As shown in FIG. **2**, and in FIGS. **3**, **4** and **6**, one side of the base **50**, i.e., the filter side, is also provided with a relatively thin flat upright wall flap valve **68** extending in the direction of the upper envelope piece **14** across the width of the base **50**, and located on the throat side of the post **60**, opposite the filter **58**. When inserted in the mouthpiece, this flap valve **68** cooperates with an inwardly extending ridge **70** on the inside of the upper envelope wall **18** and spaced from the flap valve to act as a one-way valve. The ridge **70**, being relatively thick, acts as a shut-off land for the flap valve **68**. The flap valve **68**, being relatively thin, easily passes under the ridge **70** when the cartridge is being inserted into the mouthpiece.

On the very end of the base **50** on the side opposite the inhale flap valve **68**, there is also provided a relatively thin wall flap valve **72** extending the width of the base **42** which also engages an upwardly extending ridge **74** on the lower envelope wall **20** located at the very end of or near the exit or throat opening **42** and spaced from the flap valve act as a one-way valve. This ridge **74**, being located on the other side of the valve **72** as compared to the inhale flap valve **68** and its land **70**, acts as a shut-off land for the flap valve **72** for air moving in the opposite direction to the flow of air in the inhale corridor. Note that a clearance **76** is provided at the junction of the wall **72** and base **50** to give the flap valve **72** more freedom of movement since its extension in the direction of the lower envelope is much less than the extension of the inhale flap valve **68**. This shortness of the exhale valve tends to make the material less resilient.

To lock the filtering cartridge in the mouthpiece, the side walls **20** and **22** of the envelopes are provided with slots or openings **78** and **80** ($\frac{1}{2}$ of each of the openings formed in the upper and lower envelope pieces), into which suitable projections or bosses **82** and **84** formed on the sidewalls of the base **50** are inserted. Because of the resilient nature of the material utilized, in this case polypropolene, the filtering cartridge can be easily inserted and removed from the mouthpiece, although a slight force, such as provided by a finger might be inserted into the throat opening **38** might be necessary to cause the bosses to disengage from the openings.

Finally, as an optional feature, an additional filter, such as **86**, may be provided in the exhale corridor **54** to act as a trap to catch mucus if desired. This filter can be held in place by any suitable means such as by adding additional spikes on the bottom of the wall **50**.

The foregoing shows that there are additional advantages which acrue. For example, while the base **50** is made of polypropolene, a plastic which is sterilizable, as by boiling, and with sufficient body to support the posts **60** and the valves **68** and **72**, the envelope can be preferably made out of methylpentene, which is resistant to acids, is sterilizable by boiling, and provides a better welding material for ultra sonic welding. The latter, by the way, is preferable since there are no solvents or additives which might react with the medication and, the material being clear, permits a visual inspection of the flap valves and assumes the color of the face when the safety shield **34** is against the skin surrounding the mouth.

Another advantage of this respiratory control involves epileptics. Epileptics, when in their loss of control, are endangered further by a swallowing of the tongue, so they generally have a large gauze ball inserted in their throat to prevent that occurrence. This method impedes breathing and can choke the patient if a nasal block exists. In this instance, the respiratory control can function to hold the tongue, give free breathing and can be medicated, if necessary. Insertion can be made by the epileptic when an attack is imminent.

Another advantage in this respiratory control is that the flap valve **72**, the exhale one-way valve, can be made in various thicknesses to force exhale breathing as a means for exercising the lungs. Thus, the thickness of the flap valve **72** can be selected and prescribed by a doctor for a patient having emphysema to force the patient to exercise the lungs by starting, for example, with a relatively thin valve and gradually increasing to a rather thick valve. This gradual increase in thickness forces the exercise of the lungs.

Turn now to FIGS. **7–10** which illustrate the second embodiment of the invention. For simplicity, those

elements performing the same function in this embodiment are given the same reference numeral with the addition of the suffix a. Thus, in general, the mouthpiece of this embodiment is formed in two envelope pieces **14***a* and **16***a* and is provided with a removable filtering cartridge **28***a*. In this embodiment, however, the flap valves **68***a* and **72***a* do not form part of the filter cartridge but are part of the mouthpiece. Each valve has an integral pivot rod **90** and **92**, circular in cross section, which extends beyond the thin walls of the valves **68***a* and **72***a*, to seat and pivot in matching slots **94** on each edge of the side walls **22***a* and **24***a* (only the slots in the side walls of the envelope **16***a* being shown). The valves are held in place in these matching slots **94** as shown in FIGS. **9** and **10** and engage shut-off lands **70***a* and **74***a* during inhale and exhale. It is to be noted also, that in this embodiment, the grooves **44***a* and base **50***a* do not extend the full length of the envelopes to accommodate the matching slots **94** and to permit freedom of movement of the valves by having the sidewalls **22***a* and **24***a* in parallel near the throat end of the mouthpiece. Also, it is to be noted that the valve shut-off land **74***a* is located inwardly of the throat end as contrasted to the location of the shut-off valve **74** depicted in FIG. **6**. Further, to prevent the inhale valve **68***a* from tilting too far in the direction of the throat end, a stop means in the form of an inwardly extending lug **96** is provided in the side wall **24***a*. Thus, the inhale valve has a pivotal movement which is limited but still sufficient not to interfere with its function.

Finally, in this embodiment, it is pointed out that the inhale corridor **52***a* and exhale corridor **54***a* are equal in area and thus the filtering material **58***a* is thinner than the filtering material **58**.

Also, from the foregoing it can be seen that the filter cartridges **58** and **58***a* being provided with filtering material, can be assembled separately and purchased as a sealed package containing medication for the relief of nasal congestion and the like, or may be assembled and purchased free of medication, so that the filtering material may be used either dry, or moistened, for filtered air breathing. The filtered air, or medicated filtered air, can provide relief, or a decrease in cure time, from many breathing difficulties, sicknesses, the common cold, sinus, asthma, bronchitis, emphysema, smog irritation, etc, and with the addition of water in the filter, can preclude dry mouth and other discomforts and can increase the oxygen intake for a decrease in breathing rate.

What is claimed is:

1. A respiratory control for use in the mouth cavity for controlled breathing comprising, means defining a mouthpiece adapted to be inserted inside the mouth cavity and having a bore extending therethrough with first and second open ends, said bore being tapered from said first open end to said second open end, said first open end adapted to be located near the entrance to the mouth cavity and said second open end being adapted to be located in the back or throat portion of the mouth cavity,

means defining first and second air corridors between said first and second open ends, said first corridor for the flow of air during inhalation and said second corridor for the flow of air during exhalation,

valve means in said bore permitting the flow of air in said first corridor only from said first open end to said second open end and permitting the flow of air in said second corridor only from said second end to said first end, and

filtering means in said first corridor for providing filtered and enhanced air to the mouth cavity.

2. The respiratory control as claimed in claim **1** wherein said means defining said mouthpiece is provided with a safety shield outwardly of said first open end which engages the lips and area surrounding the mouth to prevent swallowing of the respiratory control.

3. The respiratory control as claimed in claim **2** further including teeth gripping means spaced from said safety shield.

4. The respiratory control as claimed in claim **3** wherein said means for dividing said cavity into corridors and said filter define a replaceable cartridge for the mouthpiece.

5. The respiratory control as claimed in claim **4** wherein said valve means comprises a ridge extending inwardly of said bore and transversely in each respective corridor which define shut-off valve lands for said valve means and relatively thin oppositely directed walls extending into each corridor from said cartridge towards said ridges, said walls being disposed with respect to said ridges thereby cooperating with said ridges to define a pair of one-way valves which operate in opposite directions during inhalation and exhalation.

6. The respiratory control as claimed in claim **4** wherein said valve means comprises a ridge extending inwardly of said bore and transversely in each respective corridor which define shut-off valve lands for said valve means and relatively thin oppositely directed walls mounted in said bore and extending into each corridor towards said ridges, said walls being disposed with respect to said ridges thereby cooperating with said ridges to define a pair of one-way valves which operate in opposite directions during inhalation and exhalation.

7. The respiratory control as claimed in claim **6** wherein said cartridge is provided with means for preventing movement of the filtering material.

8. The respiratory control as claimed in claim **7** wherein said means for preventing movement of said filtering material comprises spikes which interface with said filtering material.

9. The respiratory control as claimed in claim **8** wherein said means for preventing movement of said filtering material comprises posts on said cartridge for preventing movement of said filtering material towards the throat area.

10. The respiratory control as claimed in claim **9** wherein said cartridge has ribs extending the length thereof for spacing said cartridge in said bore and means associated with said bore for aiding in the insertion of the cartridge into the bore.

11. The respiratory control as claimed in claim **10** wherein said cartridge is provided with locking means which engage in cooperating locking means in said bore for locking said cartridge within the bore.

12. The respiratory control as claimed in claim **11** wherein said valve means is used to control the inhaled or exhaled pressure required to open said valve means into either corridor to exercise a person's lungs.

13. The respiratory control as claimed in claim **12** further and including additional filtering means in the exhaled corridor for trapping mucus and the like exhaled from a person.

14. A respiratory control comprising,